

**U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM**

SCIENTIFIC NAME: *Samoana fragilis*

COMMON NAME: Fragile tree snail, or akaleha

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: April 2010

STATUS/ACTION

☐ Species assessment - determined we do not have sufficient information on file to support a proposal to list the species and, therefore, it was not elevated to Candidate status

☐ New candidate

☒ Continuing candidate

☐ Non-petitioned

☒ Petitioned - Date petition received: May 11, 2004

☐ 90-day positive - FR date:

☒ 12-month warranted but precluded - FR date: May 11, 2005

☐ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? Yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? Yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded.

Higher priority listing actions, including court-approved settlements, court-ordered and statutory deadlines for petition findings and listing determinations, emergency listing determinations, and responses to litigation, continue to preclude the proposed and final listing rules for the species. We continue to monitor populations and will change its status or implement an emergency listing if necessary. The "Progress on Revising the Lists" section of the current CNOR (<http://endangered.fws.gov/>) provides information on listing actions taken during the last 12 months.

☐ Listing priority change

Former LP: ☐

New LP: ☐

Date when the species first became a Candidate (as currently defined): November 15, 1994

☐ Candidate removal: Former LPN: ☐

☐ A - Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or

continuance of candidate status.

- ___ U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.
- ___ F – Range is no longer a U.S. territory.
- ___ I – Insufficient information exists on biological vulnerability and threats to support listing.
- ___ M – Taxon mistakenly included in past notice of review.
- ___ N – Taxon does not meet the Act’s definition of “species.”
- ___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Snails; Family Partulidae (snail)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Guam;
Commonwealth of the Northern Mariana Islands (island of Rota)

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Guam;
Commonwealth of the Northern Mariana Islands (island of Rota)

LAND OWNERSHIP: Four of the five sites occur on lands owned by the U.S. Department of Defense (DOD) on Guam and one site occurs on privately owned land on Rota, in the Commonwealth of the Northern Mariana Islands (CNMI).

LEAD REGION CONTACT: Linda Belluomini, (503) 231-6283, linda_belluomini@fws.gov

LEAD FIELD OFFICE CONTACT: Pacific Islands Fish & Wildlife Office, Christa Russell
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BIOLOGICAL INFORMATION

Species Description

The conical shell of this snail is 0.5 to 0.6 inches (in) (12 to 16 millimeters (mm)) long, 0.4 to 0.5 in (10 to 12 mm) wide, and is formed by four whorls that spiral to the right. The common name is derived from the thin, semi-transparent nature of the shell. The shell has delicate spiral striations intersected by transverse growth striations. The background color is buff, tinted by narrow darker maculations and whitish banding that are derived from the internal organs of the animal that are visible through the shell (Crampton 1925).

Taxonomy

The genus *Samoana* is represented in the Mariana Islands by a single species, the fragile tree snail (*Samoana fragilis*). The fragile tree snail was first collected on Guam in 1819 by Quoy and Gaimard during the Freycinet Uranie expedition of 1817 to 1819 (Crampton 1925). Crampton’s 1925 taxonomic work for this species is the most recent and accepted taxonomy for this species.

Habitat/Life History

Partulid tree snails prefer cool, shaded forest habitats (Crampton 1925; Cowie 1992; Smith 1995) with high humidity and reduced air movement that might otherwise promote excessive water loss. Crampton (1925) described the habitat requirements of the partulid tree snails of the Mariana Islands as, “a sufficiently high and dense growth to provide shade, to conserve moisture, and to effect the production of a rich humus. Hence the limits to the areas occupied by *Partulae* are set by the more ultimate ecological conditions which determine the distribution of suitable vegetation.” Crampton (1925) further described the intact structure of native Mariana forests as having four general levels: high trees; shrubs and *Pandanus*; cycads and taller ferns; and succulent herbs. He noted that the Mariana Islands partulid tree snails preferentially live on subcanopy vegetation and do not use the high canopy trees.

The fragile tree snail exhibits two reproductive characteristics, which are unique among the Mariana Islands’ partulid snails. Adults attain sexual maturity before reaching maximum shell size and have relatively large eggs (0.13 to 0.16 in (3.3 to 4.3 mm)) that are encapsulated in a tough, calcareous shell (Crampton 1925). These egg shells are reabsorbed and the snail gives birth to live young. In general, partulid snails begin reproducing in less than 12 months and may live up to 5 years. Up to 18 young are produced each year. The snails are generally nocturnal, live on bushes or trees and feed on decaying plant material.

Historical Range/Distribution

The fragile tree snail has been reported from the islands of Guam and Rota. In 1920, Crampton (1925) documented fragile tree snails from 13 sites on Guam. Kondo (1970) documented the 1959 discovery of the fragile tree snail on Rota by R.P. Owen. A previous island survey in 1952 (Kondo 1970) did not find this species.

Current Range/Distribution

In 1989, Hopper and Smith (1992) resurveyed Crampton’s original sites plus several more, all on Guam. At that time, they found fragile tree snails at only six sites. The most recent survey on Guam for the fragile tree snail was conducted on February 26, 2008 and between May 21 and August 30, 2008. Only one colony was found to have the fragile tree snail at Pugua Point Colony (Smith et. al., 2009). The original site where this species was found on Rota is mostly agricultural fields and no living snails were found there in 1995 (Bauman 1996). In 1996, a new site was found in a different area (Bauman 1996).

Population Estimates/Status

There are no quantitative estimates for the fragile tree snail (Bauman 1996) but Crampton (1925) described this species as rare.

THREATS

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

Following World War II, open agricultural fields and other areas prone to erosion on Guam were seeded with *Leucaena leucocephala* (tangentangan), which grows as a single species stand with no substantial understory. The microclimatic condition in such areas is dry with little accumulation of leaf litter humus, and is particularly unsuitable as partulid tree snail habitat (Hopper and Smith 1992). In addition, native forest cannot reinvade and grow where this alien

weed has become established (Hopper and Smith 1992; F. Amidon, U.S. Fish and Wildlife Service (Service), pers. comm. 2007).

Typhoons are a common occurrence in the Mariana Islands and have impacted the remaining forests on these islands. The island of Guam, for example, has been affected by typhoons in 37 of the last 50 years (Naval Pacific Meteorology and Oceanography Center Joint Typhoon Warning Center (JTWC) 2007). During the 1990s Guam experienced 20 typhoons, and supertyphoons (having gusts exceeding 150 miles (mi) (240 kilometers (km)) per hour) occur with regularity (about once every 5 to 10 years). There is some evidence that the frequency of severe storms (estimated gusts exceeding 100 m (160 km) per hour) is increasing in the Mariana Islands. The historical record for Guam shows increasing numbers of mild (estimated gusts in the range of 50 to 100 mi (80 to 160 km) per hour) and severe storms over the last three centuries, as well as in just the last decade (JTWC 2007). These storms have been known to defoliate forested areas and down trees, which can impact tree snail populations. For example, in August 2004, Typhoon Chaba stalled 25 mi (40 km) north of Rota for several hours, downing trees and defoliating large sections of the forested areas, especially on the windward side of the island (JTWC 2007). Vegetation changes associated with this storm have opened up forested areas that were excellent habitat for partulid tree snails. These open forests suffer from changes in microhabitat, such as desiccation, that make the continued survival of snails unlikely. These changes continue to occur today with each successive typhoon (F. Amidon, Service, pers. comm. 2005).

The structure of the limestone forest on Guam and Rota is slowly changing due to the presence of Philippine deer (*Cervus mariannus*) (Guam and Rota), feral pigs (*Sus scrofa*) (Guam), water buffalo (*Bubalus bubalis*) (Guam), and cattle (*Bos taurus*) (Rota), as they browse on seeds and seedlings retarding regeneration of the forest plants (Wiles *et al.* 1999). These ungulates have caused severe damage to native forest vegetation by browsing directly on plants, causing erosion (Marshall *et al.* 1995; Kessler 1997), and retarding forest growth and regeneration (Lemke 1992). This in turn reduces the quantity and quality of forested habitat for the fragile tree snail.

Smith *et al.* 2009, described the Naval Computer and Telecommunications Station at Finegayan on Guam as having an understory that had been severely damaged by feral ungulates. The removal of the understory trees and shrubs has allowed for greater air motion and resulting desiccation makes the conditions unsuitable for the survival of land snails.

B. Overutilization for commercial, recreational, scientific, or educational purposes.
None known.

C. Disease or predation.

Predation by the alien rosy carnivore snail (*Euglandina rosea*) and the alien Manokwar flatworm (*Platydemis manokwari*) is a serious threat to the survival of the fragile tree snail. The predatory rosy carnivore snail is native to the southeastern United States, and was introduced into the Mariana Islands, including Rota, and Guam, in 1957 (Eldredge 1988). Since being introduced, this voracious predator of snails has been dispersed by humans throughout the main islands.

The rosy carnivore snail was imported to these and other Pacific islands as a biological control agent for another alien snail, the giant African snail (*Achatina fulica*), which is an agricultural

pest. However, while its effectiveness as a biological control agent against the giant African snail is questionable (Mead 1961; Tillier and Clarke 1983; Christiansen 1984), field observations have established that the rosy carnivore snail will readily feed on native Pacific island tree snails, including the Partulidae (Tillier and Clarke 1983; Murray *et al.* 1988; Miller 1993) and the Hawaiian achatinellid tree snails (Hadfield *et al.* 1993). A study of the diet of the rosy carnivore snail on the island of Mauritius in the Indian Ocean showed that this alien predator preferred native snails over the targeted alien giant African snail (Griffiths *et al.* 1993). On some or all of these tropical islands, the rosy carnivore snail has expanded its normal terrestrial feeding behavior to include native snails found in arboreal habitats (Murray *et al.* 1988; Hadfield *et al.* 1993; Miller 1993). The rosy carnivore snail has caused the extinction of many populations and species of native snails throughout the Pacific islands (Tillier and Clarke 1983; Murray *et al.* 1988; Hopper and Smith 1992; Hadfield *et al.* 1993; Miller 1993).

Predation on native partulid tree snails by the terrestrial Manokwar flatworm is also a threat to the long-term survival of these snails. This voracious snail predator was introduced into Guam in 1978 and has been spread by humans throughout the main Mariana Islands, including Rota (Eldredge 1988). It has proven to be an effective biological control agent for the giant African snail but it has also contributed to the decline of native tree snails, in part due to its ability to ascend into trees and bushes that support native snails. Areas with populations of the flatworm usually lack partulid tree snails or have declining numbers of snails (Hopper and Smith 1992).

D. The inadequacy of existing regulatory mechanisms.

The fragile tree snail currently receives no protection under the federal Endangered Species Act (16 U.S.C. §1531-1544). It also does not receive protection under the CNMI Endangered Species List (Public Law 2-51 CMC 5108b), but does receive protection under the Guam Endangered Species Act (5GCA Ch. 63).

E. Other natural or manmade factors affecting its continued existence.

Even if the threats responsible for the decline of this species were controlled, the persistence of existing populations is hampered by the small number of extant populations and the small geographic range of the known populations. These circumstances make the species more vulnerable to extinction due to a variety of natural processes. Small populations are particularly vulnerable to reduced reproductive vigor caused by inbreeding depression, and they may suffer a loss of genetic variability over time due to random genetic drift, resulting in decreased evolutionary potential and ability to cope with environmental change (Lande 1988; Pimm *et al.* 1988; Center for Conservation Biology 1994; Mangel and Tier 1994). Randomly occurring natural events such as typhoons and droughts could eliminate one or more of the five remaining populations of the fragile tree snail. This is especially true due to several life-history features of this and all other partulid tree snails (Cowie 1992): reproductive rates are low; eggs are not laid as in most terrestrial snails, but the young are born live; dispersal is very limited with most individuals remaining in the tree or bush into which they were born. All of these traits make these snails very sensitive to any random event that could lead to a reduction or loss of reproductive individuals.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

Efforts are underway to update the status of snail populations in the Mariana Islands. On Guam

an island-wide survey of terrestrial gastropods began in 2006. Data from these surveys will be used to develop a wildlife conservation management plan for Guam snails (B. Smith, pers. comm. 2006).

In addition, the CNMI Division of Fish and Wildlife (DFW) has informed us that a project to survey endemic land snails has been funded under the State Wildlife Grant. DFW hopes to complete a survey of snails on Rota (DFW *in litt.*).

SUMMARY OF THREATS

Based on our evaluation of predation by the nonnative rosy carnivore snail and nonnative flatworms, we conclude there is sufficient information to develop a proposed rule for this species. In addition, this species is threatened by habitat degradation and loss from typhoons and feral pigs, Philippine deer, water buffalo, and cattle that browse on native forest plants and facilitate erosion, and by changes in microclimate conditions caused by the replacement of native limestone forest plants with monocultures of the nonnative tangantangan. We find that this species is warranted for listing throughout all its range, and, therefore, find that it is unnecessary to analyze whether it is threatened or endangered in a significant portion of its range.

For species that are being removed from candidate status:

____ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

RECOMMENDED CONSERVATION MEASURES

- Conduct surveys for fragile tree snails
- Develop and implement nonnative snail removal and control program
- Develop and implement nonnative flatworm removal and control program
- Conduct habitat restoration
- Conduct ungulate (deer, pigs, water buffalo, and cattle) removal and control
- Restoration of native understory

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2*
	Non-imminent	Subspecies/population	3
		Monotypic genus	4
		Species	5
Moderate to Low	Imminent	Subspecies/population	6
		Monotypic genus	7
		Species	8
	Non-imminent	Subspecies/population	9
		Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude:

The primary threat to the fragile tree snail by predation from nonnative predatory snails and flatworms is of high magnitude. These nonnative predators occur throughout the range of the fragile tree snail. In addition, this tree snail is threatened by habitat degradation and destruction by nonnative ungulates and plants and extinction from small population numbers and limited geographic range due to randomly occurring natural events such as typhoons.

Immediacy of Threats:

Threats to this species from predation by nonnative predatory snails and flatworms, and habitat loss and degradation is imminent because it is ongoing.

____ Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed? Yes.

Is Emergency Listing Warranted? No. The species does not appear to be appropriate for emergency listing at this time because the immediacy of the threats is not so great as to imperil a significant proportion of the taxon within the time frame of the routine listing process. If it becomes apparent that the routine listing process is not sufficient to prevent large losses that may result in this species' extinction, then the emergency rule process for this species will be initiated. We will continue to monitor the status of the fragile tree snail as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

DESCRIPTION OF MONITORING

We conducted literature searches for recent articles on this species and contacted the Commonwealth of the Northern Mariana Islands (CNMI) Division of Fish and Wildlife (DFW) and the Guam Division of Aquatic Wildlife and Resources (DAWR) regarding the current status of this species. New information on the species' status was provided and incorporated into this assessment. Existing data regarding the species' status was verified.

This level of monitoring is appropriate to update the status of the species because a thorough literature search was conducted as well as relevant species experts contacted. Information contained in this assessment form was verified and any updated information incorporated.

List of Experts Contacted:

Name	Date	Affiliation
Sylvan O. Igisomar	January 29, 2010	CNMI Division of Fish and Wildlife, Saipan
Celestino Aguon	January 29, 2010	Guam Division of Aquatic Wildlife and Resources

This species is listed as critically endangered (CR) in the International Union for Conservation of Nature and Natural Resources (IUCN) Red Data List database (IUCN 2006). The fragile tree snail is included in the list of species in the Guam Comprehensive Wildlife Conservation Strategy (Guam Division of Aquatic Wildlife and Resources 2005) and in the Commonwealth of the Northern Mariana Islands' 2005 Comprehensive Wildlife Conservation Strategy (Berger *et al.* 2005).

COORDINATION WITH STATES

On January 29, 2010, we sent a letter to the Guam Division of Aquatic and Wildlife Resources and to the CNMI Division of Fish and Wildlife requesting their review and comments on our most recent candidate assessment of this species. No response was received from either the CNMI DFW or the Guam DAWR.

LITERATURE CITED

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Personal Communications

Aguon, C., Guam Division of Aquatic and Wildlife Resources, Letter regarding DAWR's response to request for information on candidate assessment forms. March 20, 2009.

Amidon, F., Service. Memo to file, biologists discussion of conditions on Rota. July 11, 2005.

Amidon, F., Service. Notes to file on condition of tangantangan on the island of Guam. 2007.

Igisomar, S.O., CNMI Division of Fish and Wildlife, Letter regarding CNMI's response to request for information on candidate assessment forms. February 27, 2008.

Smith, B., University of Guam. Email in response to request for review of candidate assessment forms. September 14, 2006.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve:

Acting Carolyn D. Bohan 5/18/10
Regional Director, Region 1, Fish and Wildlife Service Date

Ronan W. Gould
ACTING
Director, Fish and Wildlife Service October 22, 2010

Concur:

Do not concur: _____
Director, Fish and Wildlife Service Date

Director's Remarks:

Date of annual review: April 16, 2010
Conducted by: Lorena Wada, Pacific Islands FWO
Biologist, Prelisting and Listing Program

Comments:
PIFWO Review

Reviewed by: Christa Russell Date: April 23, 2010
Prelisting and Listing Program Coordinator

Marilet Zablan Date: April 26, 2010
Assistant Field Supervisor, Endangered Species Division

Gina Shultz Date: April 30, 2010
Acting Field Supervisor